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PASC'17: Platform for Advanced Scientific Computing, Lugano June 26-28th 2017

Exascale Solver For Application-Driven Science: Domain Decomposition [Minisymposium]

A Massively Parallel Method for the Full Waveform Inversion in Geophysics: Current Status and Perspectives

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Solving nonlinear seismic inversion problems governed by wave propagation models based on partial differential equations is one of the most challenging procedures to obtain quantitative information of the subsurface in geophysics. Thus massively parallel solvers that scale up to million or billion of unknowns must be developed.

In this talk, we describe our past and recent efforts to design and analyze parallel numerical algorithms for the solution of those large-scale nonlinear optimization problems on massively parallel platforms. In such a context, we have proposed block flexible Krylov subspace methods combined with a multigrid preconditioner to tackle the solution of the resulting large-scale linear systems with multiple right-hand sides. We also discuss current efforts toward the design and analysis of Krylov subspace methods (such as inexact or pipelined Krylov subspace methods with variable multilevel preconditioners) that are worth considering at the exascale level.